

## VLF CR series

# Portable VLF test systems for testing medium voltage cables according to IEC 60502-2 and IEEE 400.2



- **VLF, DC and sheath fault testing in one device**
- **Portable thanks to two-part construction**
- **High test capacitance**
- **Integrated discharge system**
- **Reporting**

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### DESCRIPTION

The VLF CR Series are portable, efficient, high-performance systems for testing cables with 0.1 Hz cosine-rectangular voltages, in keeping with IEC and IEEE standards. In accordance with these guidelines, the dielectric strength of cables and joints must be checked after installation or repair.

Three portable systems are available, each with different voltage levels (28, 40 and 60 kV):

- VLF CR-28 up to 15 kV rated cables
- VLF CR-40 up to 23 kV rated cables
- VLF CR-60 up to 36 kV rated cables

#### High test capacity

The systems consist of a control unit and an HV unit. Because of their two-part construction, the systems are easy to transport.

One of the advantages of the cosine-rectangular test method is the high test capacitance of up to 5  $\mu\text{F}$  at 0.1 Hz. This test capacitance allows all three phases to be tested simultaneously with the standardized test frequency of 0.1 Hz.

#### Proven procedure

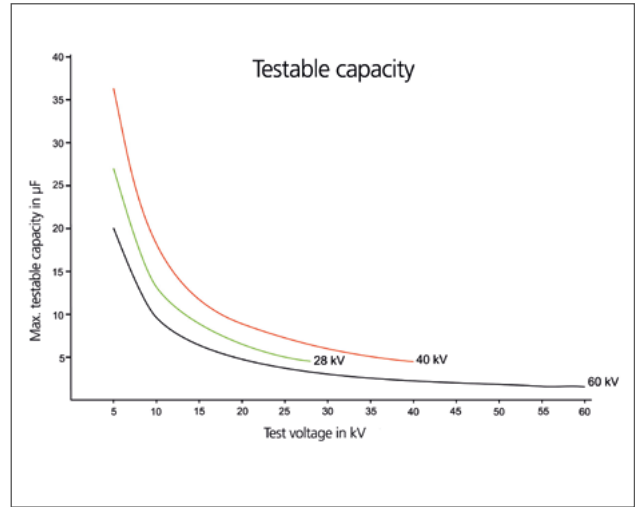
Using 0.1 Hz cosine-rectangular voltage, weak points in the cable can be safely broken down. The benefits of the VLF method using 0.1 Hz cosine-rectangular voltage have been confirmed by numerous scientific examinations and practical field trials. Since the patent was granted in 1987, more than 2,500 systems have been sold worldwide. This proven voltage shape is recommended by the CENELEC HD 620 and HD 621 harmonisation documents, the IEC 60502-2 standard and the IEEE 400.2 standard.

#### DC testing, sheath fault testing and pinpointing

By switching to DC testing, the cables and connected substations can be tested with negative and positive DC voltage. Aside from cable and sheath testing, the test systems can also be used to precisely pinpoint sheath faults (in combination with a step-voltage probe e.g. the ESG NT).



VLF CR-60 kV in operation on the "Baltic 1" wind park (Baltic sea).



Test capacitance as function of the test voltage

**Maximum safety**

The integrated discharge and breakdown detection systems maximise user safety. Measuring the leakage current serves to develop a relative evaluation of cable insulation quality; test results can be archived for further processing through the logging function.

Because of its compact design and high voltage level, the VLF CR-60 is ideally suited for testing 30/36 kV cables in offshore areas.

Testing offshore cables regularly is vital because any downtime will result in massive financial losses.

The modified offshore system found in the VLF CR-60 meets all applicable requirements for sea-bound operations. Optional transport containers are also available, which protect the system against water ingress. The VLF CR-60 can be stored and transported easily in these containers. The VLF CR-60 can be stored and transported easily in these containers.



Transport container VLF CR-60

**MAXIMUM TEST LENGTH**

	<b>VLF CR-28 kV</b>	<b>VLF CR-40 kV Basic</b>	<b>VLF CR-40 kV Plus</b>	<b>VLF CR-60 kV Basic</b>	<b>VLF CR-60 kV Plus</b>
<b>11 kV, 240 mm<sup>2</sup> VPE/PE cable with Up = 19 kV<sub>rms</sub></b>	Single phase: 15 km (system: 5 km)	Single phase: 11 km (system: 3.6 km)	Single phase: 22 km (system: 7.3 km)	Single phase: 6 km (system: 2 km)	Single phase: 12 km (system: 4 km)
<b>15 kV, 240 mm<sup>2</sup> VPE/PE cable with Up = 27 kV<sub>rms</sub></b>	Single phase: 12.5 km (system: 4.2 km)	Single phase: 8 km (system: 2.7 km)	Single phase: 16 km (system: 5.4 km)	Single phase: 5 km (system: 1.7 km)	Single phase: 10 km (system: 3.4 km)
<b>22 kV, 240 mm<sup>2</sup> VPE/PE cable with Up = 40 kV<sub>rms</sub></b>		Single phase: 8.7 km (system: 2.9 km)	Single phase: 17.4 km (system: 5.8 km)	Single phase: 5.2 km (system: 1.7 km)	Single phase: 10.4 km (system: 3.4 km)
<b>36 kV, 240 mm<sup>2</sup> VPE/PE cable with Up = 60 kV<sub>rms</sub></b>				Single phase: 5 km (system: 1.7 km)	Single phase: 10 km (system: 3.3 km)

**TECHNICAL DATA\***

	<b>VLF CR-28 kV</b>	<b>VLF CR-40 kV</b>	<b>VLF CR-60 kV</b>
<b>VLF output voltage</b>	0 ... 28 kV <sub>rms</sub>	0 ... 40 kV <sub>rms</sub>	0 ... 60 kV <sub>rms</sub>
<b>Resolution</b>		0.1 kV	
<b>Accuracy</b>		3 %	
<b>Leakage current measurement</b>	0 ... 12 mA	0 ... 7 mA	0 ... 5 mA
<b>Resolution</b>		10 µA	
<b>Accuracy</b>		3 %	
<b>Voltage wave shape</b>		Cosine-rectangular	
<b>Frequency</b>		0.1 Hz	
<b>Testable cable capacitance</b>			
<b>Plus version</b>		4.8 µF / 40 kV <sub>rms</sub>	2 µF / 60 kV <sub>rms</sub>
<b>Basic version</b>	5 µF / 28 kV <sub>rms</sub>	2.4 µF / 40 kV <sub>rms</sub>	1 µF / 60 kV <sub>rms</sub>
<b>DC output voltage</b>			
<b>Basic version</b>	0 ... - 28 kV	0 ... - 40 kV	0 ... - 60 kV
<b>Plus version</b>		0 ... ± 40 kV	0 ... ± 60 kV
<b>DC leakage current measurement</b>	0 ... 12 mA	0 ... 7 mA	0 ... 5 mA
<b>Discharge system</b>	Integrated	Integrated	Integrated
<b>Input voltage</b>	110/230 V, 50/60 Hz, 300 VA	110/230 V, 50/60 Hz, 300 VA	110/230 V, 50/60 Hz, 300 VA
<b>Sheath testing / sheath fault pinpointing</b>		Testing: 2 ... 10 kV Pinpointing: 2 ... 10 kV, Pulse-ratio 1:3 / 1:5 / 1:9	
<b>Leakage current measurement</b>		yes	
<b>Breakdown detection</b>		yes	
<b>Measurement log printout</b>		optional	
<b>Reporting</b>		yes	
<b>Parameterisation via chip card</b>		yes	
<b>Operating temperature</b>	-20 ... +55 °C	-20 ... +40 °C	-20 ... +40 °C
<b>Weight (depends on options fitted)</b>	approx. 25 kg + 25 kg	approx. 55 kg + 48 kg	approx. 85 kg + 48 kg
<b>Dimensions (W x H x D), divided between two devices</b>	550 x 800 x 420 mm	550 x 1100 x 420 mm	550 x 1100 x 420 mm

## ORDER INFORMATION

Product	Order nor.
<b>VLF CR-28 kV</b> Basic equipment, cable set HV/LV, accessory bag	<b>899005936-S</b>
<b>VLF CR-40 kV</b> Basic equipment, cable set HV/LV, accessory bag	<b>Basic version: 899004500-S</b> <b>Plus version: 899004501-S</b>
<b>VLF CR-60 kV</b> Basic equipment, cable set HV/LV, accessory bag	<b>Basic version: 899007186-S</b> <b>Plus version: 899007187-S</b>
<b>VLF CR-60 kV offshore</b> Basic equipment, cable set HV/LV, accessory bag	<b>Basic version: 108300017</b> <b>Plus version: 108300018</b>
<b>Optional:</b>	
<b>HV connection cable 10 m VLF CR 40/60</b>	<b>890016969</b>
<b>HV connection cable 15 m VLF CR 40/60</b>	<b>118306651</b>
<b>HV cable drum 25 m VLF CR 40/60</b>	<b>899006166</b>
<b>Transport container for offshore use</b>	<b>890025130</b>
<b>ESG NT step-voltage probe</b>	<b>1004629-S</b>

\* We reserve the right to make technical changes.

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